costly forms of treatment. There is a question, however, as to which came first, a high bed-to-population ratio or the high utilization. If the high bed-to-population ratio preceded the high hospital utilization rate, then the explanation of supply influencing demand would receive support. If however, previously high utilization led to an increase in the bed ratio, then the need or demand for hospital services would seem to be influencing the bed supply. Either explanation would be consistent with the relationship observed here, and the direction of the influence may be different across counties.

The tremendous variation in utilization rates across the 100 counties in North Carolina is not likely to be due only to differences in need. If the second explanation above (high utilization rates come first and generate pressures for more beds) is appropriate, then differences in physician practice patterns probably account for some of the observed variation in the bed-to-population ratio. The relationship between the practice style of physicians and hospital utilization has been documented in other studies (23). For example, it has been suggested that physicians in some areas tend to hospitalize for conditions handled elsewhere more frequently on an outpatient basis. Unfortunately, there was no convenient way to measure this variable for the present study.

It should be mentioned that the data used here do not necessarily indicate that high utilization in an area with a high bed supply is inappropriate, and it is likely that in some areas the bed supply is less than what is needed. A possible alternative explanation for the positive relationship between bed supply and utilization is that North Carolina has fewer hospital beds than needed, and that more beds in areas of low supply would raise utilization to an appropriate level.

To further explore the relationship between the bed supply and hospital utilization, the analysis was repeated using total patient days per 1,000 population as the dependent variable (rather than discharges). The strongest single predictor was again the bed-to-population ratio, with a standardized weight nearly twice as large as the next most important variable. The bed ratio was also the strongest predictor of age-standardized utilization rates, where the age-specific rates of each county were applied to the state's population age distribution.

In a recent study by Getts (9) of hospital use at the Health Service Area (HSA) level, the bed-to-population ratio came out as the top predictor of "deviant" patient days per 1,000 population, i.e., patient days over or under those **expected** if U.S. rates are applied to the HSA population structure. When this approach was repeated using North Carolina data, the bed ratio was also one of the top predictors. Furthermore, the number of physicians per 1,000 population had a high negative coefficient in the present study and in Getts' study. All of the variables in our regression equation accounted for 58 percent of the variation among N.C. counties in deviant patient days, while in the Getts study among HSA's the percent was 79.

Part of the positive relationship of the bed ratio to utilization is due to 17 rural counties with no hospital beds, many of which also have very low utilization. In some of these areas hospital use may not be adequate for the needs of the population, and thus it is not just overuse in heavily bedded areas that contributes to this positive relationship. However, when the regression for total discharges per 1,000 population was repeated leaving out these 17 counties with no hospital beds, the bed-to-population ratio was still by far the most important predictor, with a strong positive relationship to utilization.

It should be noted that in all regressions using the **discharge** rate, average length of stay had a negative impact, indicating that long hospital stays result in a lower turnover rate, or perhaps that a low admission rate results in longer lengths of stay. With **patient days** per 1,000 population as the dependent variable, however, length of stay had very little association, which suggests that factors besides a long average length of stay contribute to a high patient-day use rate.

The negative relationship of physicians per 1,000 population to inpatient hospital utilization is a very interesting finding. This relationship remains even after adjusting the values of two extreme outliers.[1] Contrary to the idea that more physicians means more hospital admissions, it appears that many physicians are providing services that keep people out of the hospital. A lack of physicians in a county may cause residents to go to a hospital for many of their ailments. Another contributing factor may be that more physicians means more peer review which would affect physician admitting practices in a county and result in a higher proportion of certain conditions being treated on an outpatient basis.

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[1]*Durham and Orange counties each have a medical school and thus a very high physician to population ratio, but both have relatively low resident utilization. These two unusual cases were strongly affecting the relationship, as revealed by a plot of the two variables, and thus for these two counties the physician-to-population ratio was recoded to the state average before the regression analysis was done.*